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**Military Strategy in the 21st Century: The Imperative for a New Intellectual
Paradigm**

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“Life is nonlinear. and so is everything else of interest ”

Heinz Pagels

Introduction

Much has been written of late regarding the advent of new information technologies, new weapons systems and platforms, and intelligence architectures offering to fuse real-time information that will achieve total battlefield awareness. The excitement that these advances and the ongoing Revolution in Military Affairs bring to the military strategist is palpable. While acknowledging we are on the cusp of a wondrous new technologic landscape, however, much uncertainty is expressed as to what exactly these technology breakthroughs will bring: what they will do, how they will change how we live and wage war, and how they will shape our world. Concurrently, the end of the Cold War shattered the comfortable bi-polar world the US inhabited, sending everyone, the military strategist included, scurrying to find a new roadmap. New challenges are destabilizing the international arena, while at home the burgeoning information culture encourages citizens and politicians to demand better performance and insist on more involvement in military decision-making. Modern technologies are expensive to build and deploy and the military is increasingly asked to contribute on the full spectrum of engagement, yet budgets are tight and will get tighter. Societal and epistemological changes are driving the tide of Post-modernism, questioning the very validity of “truth”, and are just beginning to send out ripples which will affect the fabric of society which undergirds the military. In short, the world is in flux on multiple levels, familiar terrain has been left behind, and many anxiously lament that the future is shrouded by a fog of uncertainty.

While the course and components of the future may not be predictable, there is one constant that can serve as a benchmark: the human mind, whose perceptual construct of reality and intellectual paradigm defines how experience is measured and reality derived. The human being is always in the equation, and the intellectual approach and tools which are brought to bear in addressing the conundrum of managing developments in the fog of the future are critical. Developing a valid intellectual approach for national leadership, including the military strategist, is the first step in beginning to meet the challenges ahead.

This paper will investigate why the new world order requires a new intellectual framework to understand and address it, examines how the new sciences of Chaos¹ and Complexity theory can provide the basis for this new framework, and explores areas of application by the military strategist

The Traditional Approach

The military strategist today is challenged to weigh risks and gains and resources to objectives, primarily in two areas the external, where real and potential threats span the spectrum of conflict--increasingly converging on military operations other than war, and the internal, where organizational structures must be pushed to do more and different things with less. The traditional methodologies and frameworks which have been used to help the strategist link means to ends have been grounded in a linear construct. This construct is based upon a Newtonian intellectual paradigm stemming from post Enlightenment scientific principals which perceived the world metaphorically as a well-oiled machine explainable through the lens of rational, logical science.

Briefly, the Newtonian linear approach assumes that a system is proportional (changes in input result in proportional changes in output), additive (the whole is the sum of its parts) and predictable (knowledge of the inputs provides knowledge of the output). Further, it is characterized by reductionism (explaining the whole by examining its parts), clockwork precision, linear causation, and mechanistic dynamics. It stresses the need for order and stability in a system. This approach, is, of course, valid in those cases where systems exhibit linear attributes which allow them to be decomposed into sub-compartments, such as algebraic equations. This approach, however, is severely limited in its application. Science, because it had a linear "hammer" perceived the universe as a linear "nail", when in actuality linear systems comprise only a small percentage of universal systems. Where the application did not fit, the problem

¹Chaos in this paper is spelled with a capital "C" to differentiate the theoretical concept as applied by the new sciences from the noun that, while descriptive, does not capture the entire concept

was either simplified until it fit the paradigm, ignored, or deemed unexplainable² Because of the rapid rate of change fueled by the information and telecommunications explosion, the strategist cannot safely overlook that which once was ignored

The Need for a New Intellectual Paradigm

"No prediction about our social life seems more certain than that complexity will increase and change will quicken" Dwight Waldo

The traditional vision can no longer stretch to accommodate the growing complexity of the world. A new intellectual paradigm is needed from which to view the world and identify the requirements for strategic leadership in a post-modern era. The "new sciences" of Chaos and complexity theory hold promise of forming the basis for the new paradigm. They propose that structure and deterministic rules underlie the non-linear phenomena not considered by the Newtonian construct. Indeed, scientific research over the past 30 years, based largely on advances in computers and computational mathematics, has provided insights and tools for the study and application of non-linear system dynamics.³

Stemming from the "new sciences" of Chaos and Complexity, these Post-modern tools are creating a new scientific paradigm replacing the Newtonian linear construct. Although in the nascent stages of non-scientific application, the new sciences non-linear paradigm promises great potential for a truly profound intellectual shift. The military strategist must command a thorough understanding of these tools--characterized by the interdependence of elements, complex adaptive systems and non-predictability--to re-examine beliefs, adapt new ones as conditions change, gain clarity in interpreting events in the external environment and develop organizational structures more conducive to dealing with change through self-organization and adaptation. New metaphors must replace the old. Thus, synthesis

²Merry, Uri, Coping with Uncertainty, Chapters 1-9

³Ilachinski, Andrew, Land Warfare and Complexity, Part II, Tier 1-8

replaces analytic, becoming replaces being, qualitative replaces quantitative, inherent disorder replaces order, process and adaptation replaces solution, holistic replaces reductionism, and disorder arising from within the system replaces disorder as originating from outside the system ⁴

Key Concepts of the New Paradigm

Several key concepts of this new paradigm are of particular import to the strategist in creating a new metaphor for a shifting reality ⁵

*Non-linearity systems that are not proportional and do not neatly add up. Instead, they are composed of synergistic interactions of many elements where the whole is not necessarily the sum of its parts. They are highly sensitive to changes in initial conditions, thus can display a disproportional small or large output for any given input.

*Emergence behaviors or properties that result from interactions within the system which differ from the elements in the system, and which are not found in nor are directly deducible from the systems' properties. The whole is something greater and different from its parts—it is transformed into something new. A holistic approach is needed to understand a complex system.

* Self-organization Patterns of order that emerge from internal system dynamics without any "control" imposed from external forces. Complex systems adapt to their environments, and instead of tending toward disorder, they tend to self-organize into more highly ordered states.

⁴Ilachinski, Andrew, Land Warfare and Complexity, Tier 1

⁵Waldrop, M. Mitchell, Complexity. The Emerging science at the Edge of Order and Chaos, 1992.

* Attractors elements in a system that attract the systems dynamics, making it behave in certain ways
Understanding a systems attractors can help in altering its behavior over time and can help in determining a future course

* Entropy dispersal and/or loss of the systems energy The ultimate equilibrium, but one in which the system is incapable of change

* Feedback loops Complex systems process information obtained from the environment and react to it based on their own internalized processes, in effect learning A system must create and maintain these loops constantly to keep healthy and alive Thus, robust intelligence systems and effective internal dialogue are critical

* Bifurcation, Chaos and complexity Chaos and complexity are points of existence on a continuum that progresses from stasis, through steady state, to complexity, and finally, to chaos This continuum is similar to a decision tree stasis or equilibrium, exists at the far left of the tree where few choices, or bifurcation points exist, systems are defunct in this area The system progresses through a steady state to complexity, where there are more choices--four to eight possible "futures", or solutions to any problem, thus, four to eight bifurcation points These are optimal futures, meaning they are all valid options, and are not an "optimum" solution, implying the best The best place for a system to exist is in the range of complexity, on the edge of chaos, where it is most alive and dynamic After the 16th bifurcation point, on the far right of the tree, is Chaos, where the system becomes chaotic and bifurcation points can no longer be identified Understanding and applying the key concepts of the non-linear paradigm can help the strategist know where he is along this continuum, and help him move in the correct direction

The new paradigm views Chaos and complexity not as the exception, but as the rule Currently, the negative "un" concepts--such as unpredictability, uncertainty, and the unknown--are avoided in favor of order, stability, and control As the complexity continuum depicts, order and stability can easily lead to stasis and entropy As the Tofflers observed, "most of reality, instead of being orderly, stable and

equilibrical is seething and bubbling with change, disorder and process, and that chaos is not unusual --⁶
The strategist must be enabled to deal with this new reality

The new non-linear intellectual paradigm will grow leaders at every level who thrive on Chaos, who can accept ambiguity to manage a world where rapid change and increasing instability will continually threaten to turn their world upside down. They will expect it, and because they have the intellectual tools to acknowledge and deal with this dynamic environment, they will not unnecessarily fear it. By creating a "comfort zone", the new approach will help the strategist 1) prepare for and manage uncertainty, which is the accepted norm, 2) discern emerging patterns in the environment and unfolding events, 3) sustain hope that the situation can be manipulated--not controlled, for that is a theoretical impossibility, but that events can be shaped toward the objective

Applications

"Chaos is the rich soil from which creativity is born " Uri Merry

The new paradigm will change how the strategist perceives and addresses a host of pressing issues. These concepts have been well applied to command and control issues, most notably in the operational arena by the Marine Corps.⁷ Its relevance to the nature of war itself is readily apparent, for operational engagements and the waging of war is a most complex and chaotic event, a phenomena covered with remarkable lucidity by Clausewitz.⁸ If previously it was "he who had the most toys wins", today it is "he who adapts first wins". Thus, there are additional areas that must be more fully explored using the new paradigm

⁶Toffler, A "New Science of Instability Throws Light on Politics", p. 4

⁷Marine Corps Concept paper 6, "Command and Control", 12 December, 1995

⁸For example, Clausewitz's observation that "the multiplicity of forms that combat assumes leads us in as many different directions as are created by the multiplicity of aims", reflects the bifurcations possible in conflict. Alan Beyerchen presents a compelling case in "Clausewitz, Nonlinearity, and the Unpredictability of War", 1992-93

The international environment is a perfect example of a complex system, where minor events can start a chain reaction that can lead to catastrophe. By achieving a better match of paradigm to strategic analysis, one can better match means to ends. The traditional approach, focused on quantity, leads one to overestimate its influence on events, discounting all but major players. The new paradigm, by focusing on pattern, acknowledges that minor actors can have a disproportionately great impact, and that desired patterns can be shaped. Externally imposed long-term stability is not a defining feature of the world. Instead, internal attractors that can cause the system to self-organize must be identified and supported, e.g. educating women in underdeveloped nations. Stability is transitory, and should not be an illusory end in itself. Chaos and reordering are opportunities to quickly exploit.⁹

One may question what utility there is in any kind of planning or preparation if the world is so complex as to be unpredictable, and whether ad hoc solutions are all that can be hoped for. This is exactly the issue that current linear planning creates a situation where crisis management is the default position because of a failure to understand the underlying complexity which could have been mitigated to avoid the crisis. Thus, planning must be deliberate with robust feedback loops (internal and external) for course correction. Short term planning can work, and it must be a continuous process. The concept of bifurcation demands exploring multiple courses of action using non-canonical scenarios, such as substituting Information Warfare Attacks or India for Iraq in planning an MRC. Technology will enhance military capability, but if applied under traditional rules may not be as revolutionary as hoped--indeed, it may prove counterproductive. Rapid turnovers in technology, speed, reach and precision strike must be leveraged using the new paradigm. Because the system is greater than the sum of its parts, the strategist understands that tinkering with one part of the organization can lead to unintended consequences and not to the improvement envisioned. For example, incremental budget cuts may result not just in a smaller organization, but transform it into something new. Strategic Planning that connects all parts, macro and micro, can create an organization capable of adaptation and renewal. High level planning, by looking to both external and internal environments must reflect uncertain futures. It can serve as a guidance system,

⁹Mann, Steven, "Chaos Theory and Strategic Thought", Parameters, Autumn, 1992

creating new multiple strategies across organizational units because a single strategy is unlikely to succeed. Unit planning is very important, for adaptive change occurs from the bottom up.

The role of management itself will change. It must reflect and adjust for the inevitable variations that will occur overtime, for stable goals in an unstable world do not accept variation. Management's new role is that of liberator, not controller, it must allow freedom, not impose unnecessary controls. The aim is not to translate the ideal into action by employees but rather to mobilize the intelligence of all to promote the mission. It must serve as a catalyst for change. The need for continual feedback requires 1) a flattened hierarchy, with less emphasis on the traditional structure, 2) focus on key processes that are well designed to promote objectives such as quality and productivity, and not on specific bureaucratic procedures. It must encourage and reward feedback from those directly engaged in the process.¹⁰ The notion of self-organization demands constant revolutionary change. Continuous innovation does not mean that plateaus are not reached, but that the manager is never satisfied. "Good enough" is not. Adopting the inevitability of uncertainty allows the manager to 1) recognize the dynamics of instability to gain insights on why change happens and 2) accept his new role. While the concept of self-organization may seem to obviate the need for the manager, but it does not--his job description has simply changed to that of determining where small nudges are needed to change processes and alter relationships.¹¹

New modeling and simulation efforts must use non-linear modes with open, not closed, system dynamics and multiple non-canonical scenarios. They must inject instability and uncertainty into computer runs and sensitivity analysis to mimic unintended outcomes of tactical through strategic action. Models must be sensitive to initial conditions and include random fluctuations such as chance factors and non-linear interactions that may lead to new patterns. This approach has been used in urban development models to

¹⁰For example, experts in the logistics field are often those who make the system work despite itself. Procedures can get in the way of the process.

¹¹Kiel, L. Douglas, *Managing Chaos and Complexity in Government*, Ch. 9.

generate pattern of new urban growth and traffic patterns. Instead of producing a “solution”, this kind of model presents a series of possible outcomes that could arise ¹²

The military strategist must become familiar with non-linear organizational dynamics to transform civilian and military structures to maximize shrinking budgets while addressing demands to increase efficiency that may require reinventing work methodologies, or retooling, or reeducating. Nonlinear dynamics reinforces the concept that the whole is greater than the sum of its parts. Self organization possesses the internal capability that allows symmetry breaks to lead to new forms of work and structures. The ultimate goal is the self organizing organization which maintains a state of constant renewal. It requires constant feedback from internal and external (including Congress and the media) environment, recognizes instability and chaos as sources of creative renewal and survives and grows into more complex forms. Corporate America has assimilated many of these concepts, which should now be studied and applied by the military strategist, as appropriate.

One might question whether the military, so dependent on its hierarchy, bureaucracy and command structure is capable of using this paradigm effectively. In actuality, the military establishment has exactly the attributes that can serve as attractors for the emergence of highly adaptive behavior that can help it survive and flourish in the post-modern environment. These attractors are 1) the quality of its people, 2) shared values, mission and vision, 3) quality of training, at the individual, team and organizational levels, 4) leadership skills and environment, 5) culture. All of these attractors must be developed simultaneously to create the necessary synergy for adaptive emergence.

The all-volunteer military has been blessed with smart, dedicated people. A quality workforce is its most important resource which must be nurtured, empowered and challenged--to bring out the best in it and to attract the new generation of military leadership. The military excels at inculcating shared values, mission and vision in its people. The Marines, in particular, have made great inroads in this area. People

¹²Ibid.

united by a shared vision are the foundation of an organization that can withstand the world of increasing complexity

Training leadership is critical--and everyone is a leader in a flattened hierarchy. The new paradigm suggests success begins at the bottom, with experienced and empowered individuals and teams. The truly adaptive system places its assets at the action level, with direct access to feedback (customer, opposition force etc.) and fully capable and authorized to take adaptive action. Leaders must be comfortable with making decisions based on uncertainty, reaching beyond incomplete data to seek out new methods and resources. The objective is to satisfise, not to optimize, because there is more than one solution to any problem. The desire for certainty in an uncertain world freezes action and is a psychological constraint on decision-making.

Fusing the other attractors into a cohesive whole is the organizational culture. It may differ by Service, component and unit, and need not look the same outwardly to adhere to the new paradigm. It must however, serve as a unifier of purpose without creating intellectual "lock-in" or dulling initiative. It must value the feedback it receives, rewarding risk takers and mavericks. The culture must pursue "perpetual novelty", for a system requires novel solutions to adapt to novel situations.¹³ Not all solutions will work as planned, thus the system must accept errors. Indeed failure, if its lessons are learned and applied, can be more meaningful to a system than success. To fail in this creates a culture that is risk averse, frozen by uncertainty and incapable of contending with change. It would exist on the far left of the bifurcation continuum, at stasis. Thus, it is critical for the organization to recognize and reward new ways of thinking and doing things that expedite the mission, regardless of the established "rules". By intentionally creating a diverse workforce, it can generate cultural pluralism, not because this is a politically correct move, but because it is a way to ensure levels of instability to generate renewal and provide new insights.

¹³Schmitt, p 28

Conclusion

The growing interconnectedness of the world, its organizational systems and the rate of change fueled by technology calls for a holistic approach to discern patterns of emergence, requiring the skills of a post-modern noeticus, the equivalent of the “Renaissance man” for our time. Technological expertise and specialization have made important contributions. But, concentration on this arena has for too long ignored the requirement for a breadth of intellectual vision based upon a mastery of non-linear, complex system dynamics using the most powerful and adaptive computer of all--the human mind. It is, in essence, the post-modern development of Clausewitz’s coup d’oeil that leads to the “glimmerings of the inner light which leads to truth”¹⁴. A non-linear intellectual paradigm can liberate strategic thought and provide more realistic policies for an age of change.

¹⁴Clausewitz, On War, p. 102

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